

# AND NOW — the STRATOLINER

*Features of the Boeing 307  
and 307-S Transports :  
Operation at 20,000ft.*

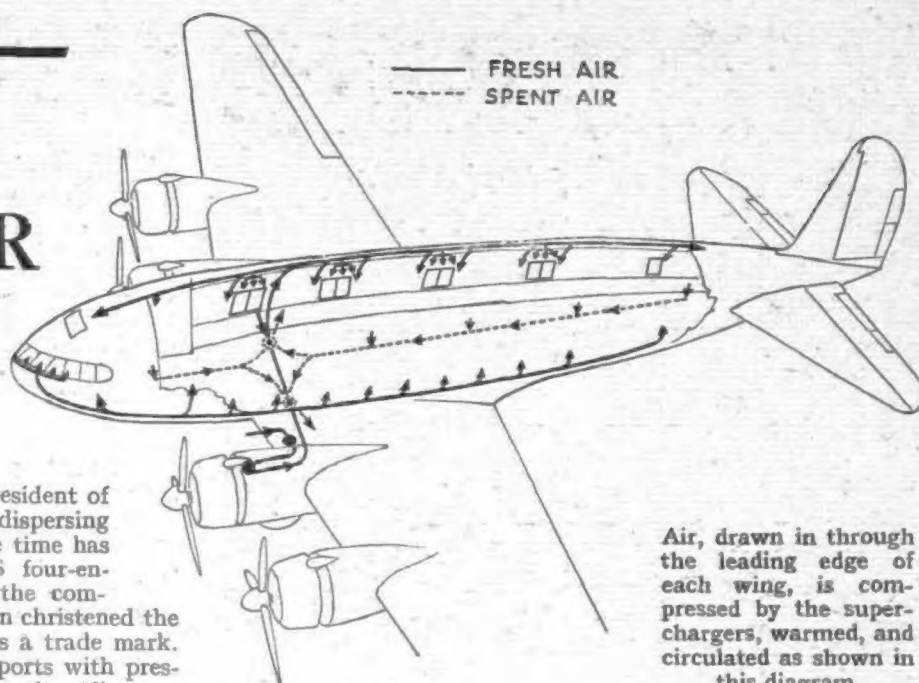
A STATEMENT by Mr. C. L. Egtvedt, president of the Boeing Company, goes far towards dispersing the haze of semi-secrecy which for some time has surrounded the Boeing 307 and 307-S four-engined transports now under construction at the company's Seattle works. The basic design has been christened the Stratoliner, the name having been registered as a trade mark. The new machines will be the first large transports with pressure cabins for high-altitude operation. As in the Albatross the fuselage is of circular cross-section throughout its length. Thirty-three passengers will be accommodated by day and twenty-five by night, and there will be stowage for 2 tons of mail and cargo. Power plants in the standard 307 will be four G-12 Wright Cyclones (1,100 h.p. for take-off); these are for operation at moderate altitudes, so presumably similar engines with two-speed blowers will be specified for the 307-S.

The basic reasons for the Stratoliner are that as height increases not only do atmospheric pressure and density decrease, but movement of the air in prevailing winds becomes swifter and more uniform, and the temperature decreases steadily with altitude—normally about  $3\frac{1}{2}$  deg. every 1,000ft. The thermometer drops to 65 deg. below zero Fahrenheit at approximately 35,000ft. (in the temperate zone), and thence upward it ceases to get colder. This region of stable temperature, extending as far up as there is still a trace of atmosphere, is the true stratosphere.

The Stratoliner's flight path will, of course, be below the true stratosphere but above the heavy air belt that brews surface weather conditions. This region is in the troposphere, more commonly known as the sub-stratosphere.

It is here that most of the benefits of the stratosphere can be obtained without becoming involved in the complex problems of flight in the extremely rare atmosphere and low temperature of the true stratosphere. At 20,000ft. there is very little difference between summer and winter. No matter what the weather is below, the thermometer always registers something like 10 deg. below zero. Although the winds are not entirely constant at this level, they are considerably more so than at lower altitudes and the air is virtually free from the turbulence that sometimes gives passengers a rough journey at lower levels.

Storm clouds and icing conditions, except on rare occasions, lie below this flight path. When thunderheads do extend into the upper level they are so localised that they may readily



Air, drawn in through the leading edge of each wing, is compressed by the superchargers, warmed, and circulated as shown in this diagram.

be avoided. Normal clouds at this height are so thin that they appear as thin smoke rather than fog when a machine passes through them.

The air is sufficiently rarefied to allow high speeds at normal cruising power. On 2,500 h.p. at 20,000ft., the Stratoliner will cruise at 240 m.p.h.

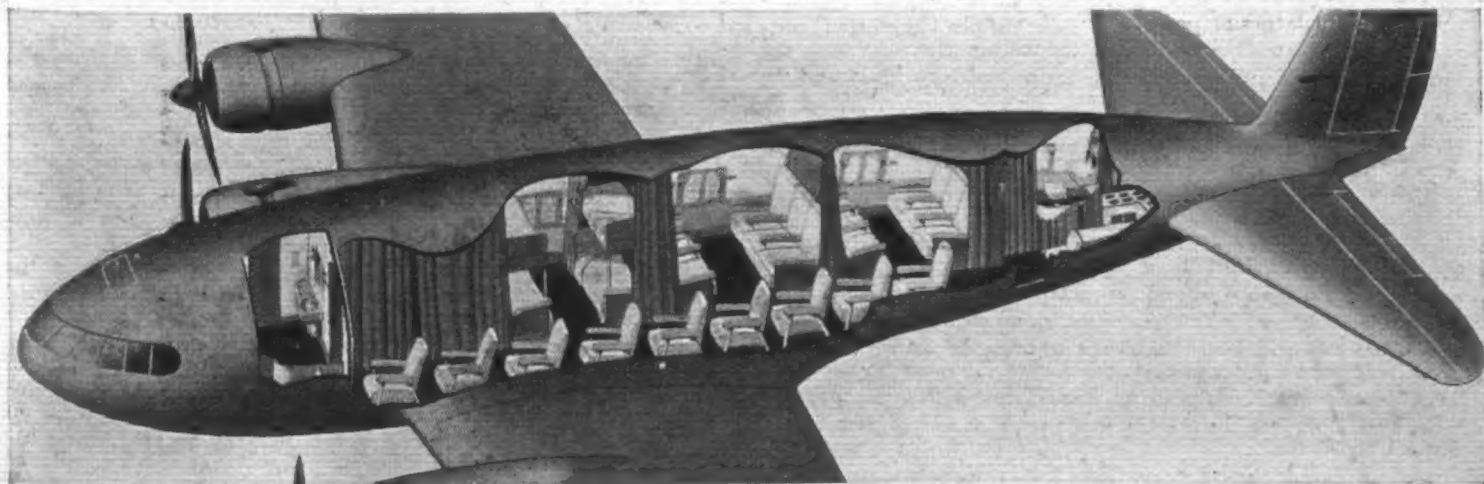
At sea level the atmospheric pressure is 14.7 lb./sq. in.; at heights up to 10,000ft., where the pressure is a third less, most persons are entirely comfortable. Up to 12,000ft. the human system continues to function quite normally, but at 13,000 and 14,000ft., where the atmospheric pressure is down to 8.6 lb./sq. in., most people are definitely aware that they are "up high"; they lose their sea level spryness. Above this point, tests have shown, the low air pressure and resultant shortage of oxygen makes a person mentally drowsy and sluggish in his actions. The effect increases with more altitude.

## Compressing and Warming

At 18,000ft. the atmospheric pressure is half as great as at sea level, and at 20,000ft. it has decreased further to 6.7 lb./sq. in. But a sample of the air taken at any of these levels shows that the percentage of oxygen and other gases is always the same. When compressed and warmed, the air at high altitudes resumes its low-altitude condition.

As the Stratoliner climbs, its mechanical superchargers and pressure regulating apparatus will come into action to preserve automatically the proper pressure inside the cabin while the outside pressure continues to decrease. The thoroughly sealed cabin, with its heavy pressure-resistant windows, will enhance the plane's normal soundproofing and should give passengers an exceptionally quiet trip.

The automatic pressure-regulating system brings a new



Cabin arrangements of the Boeing Stratoliner, which will accommodate 33 passengers by day or 25 by night. Just aft of the control cabin is the men's dressing room, and then four compartments—the first two shown made up for night travel. On the near side are nine chairs for short-trip passengers. At the rear are the women's dressing room and the galley.